Nov. 23, 1965 I. JEPSON 3,218,657

FOAM GENERATOR FOR RUG SCRUBBING APPARATUS

Filed June 25, 1963 3 Sheets-Sheet 1

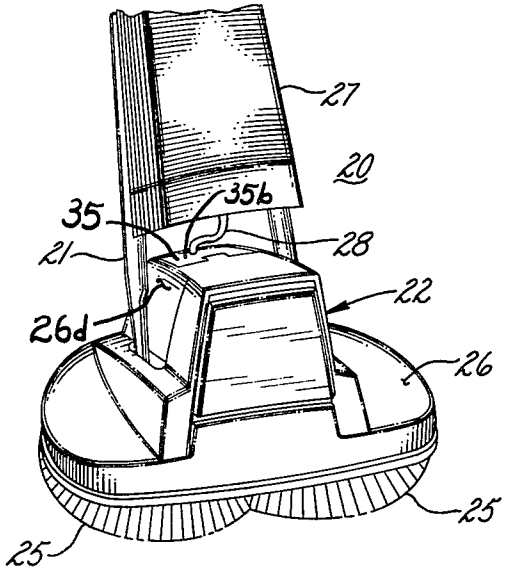

Fig-1-

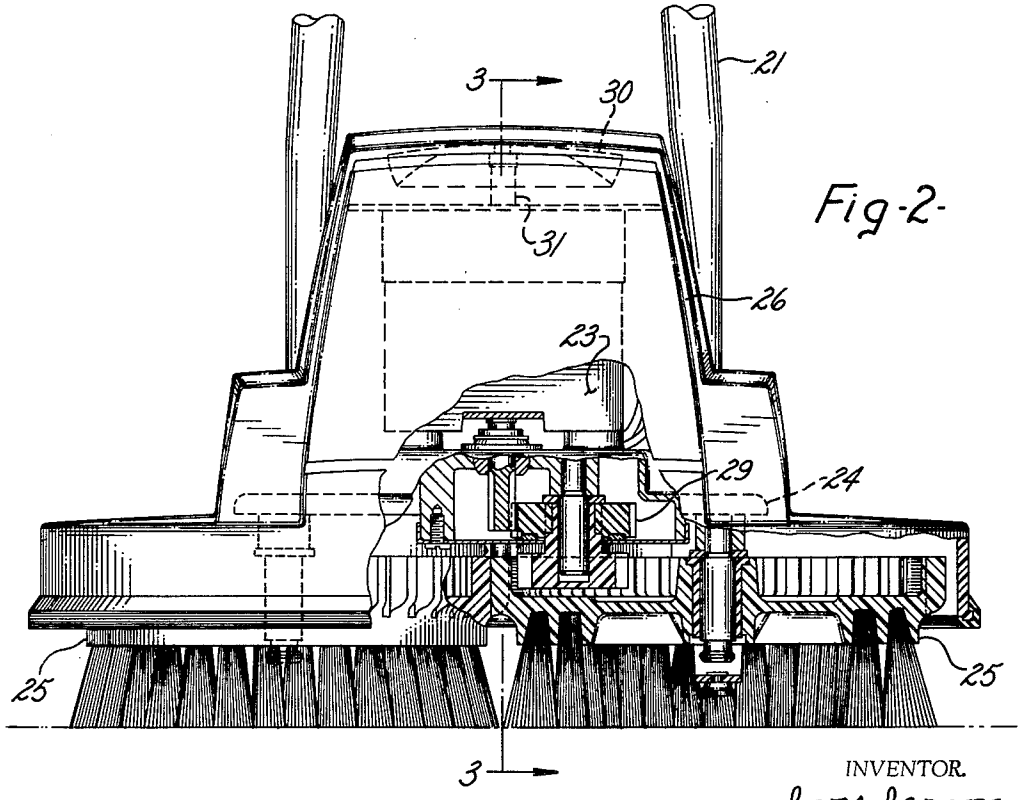

Fig-2-

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FOAM GENERATOR FOR RUG SCRUBBING APPARATUS

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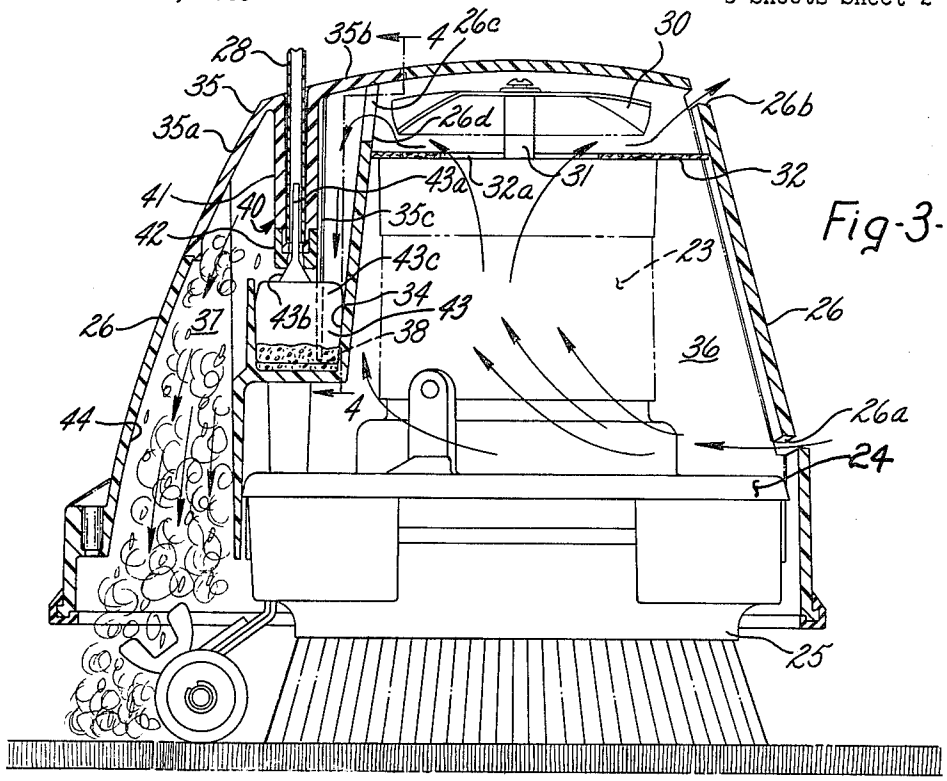

Fig-3.

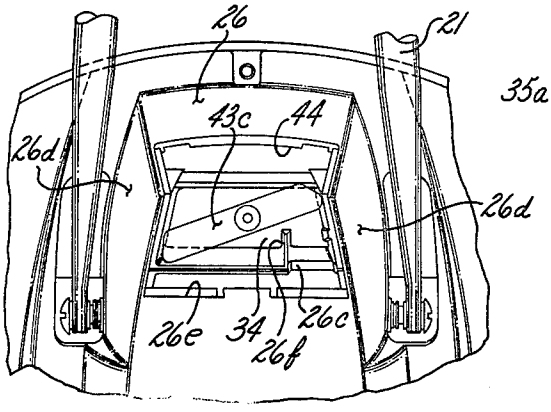

Fig-5.

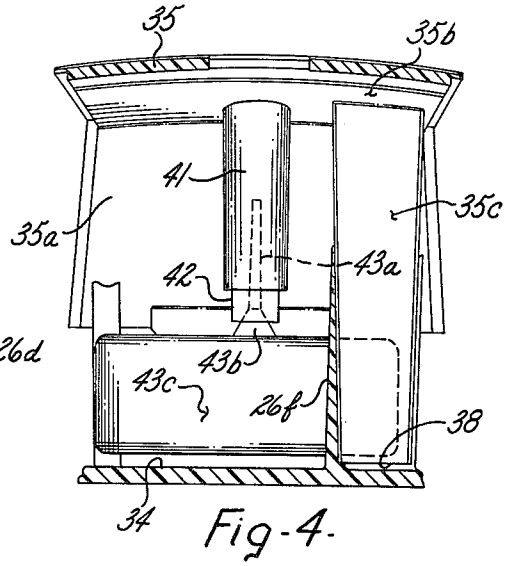

Fig-4.

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FOAM GENERATOR FOR RUG SCRUBBING APPARATUS

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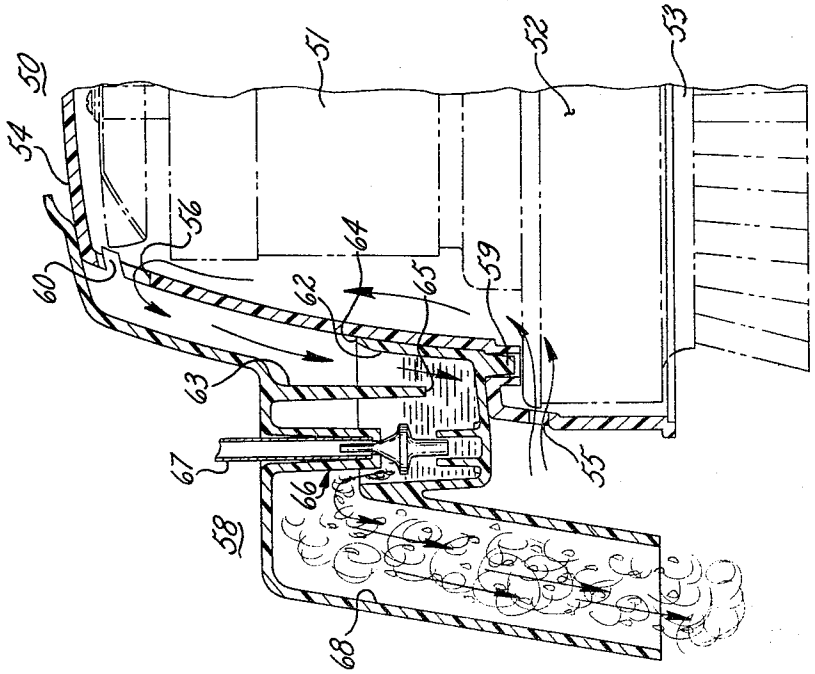

Fig-7

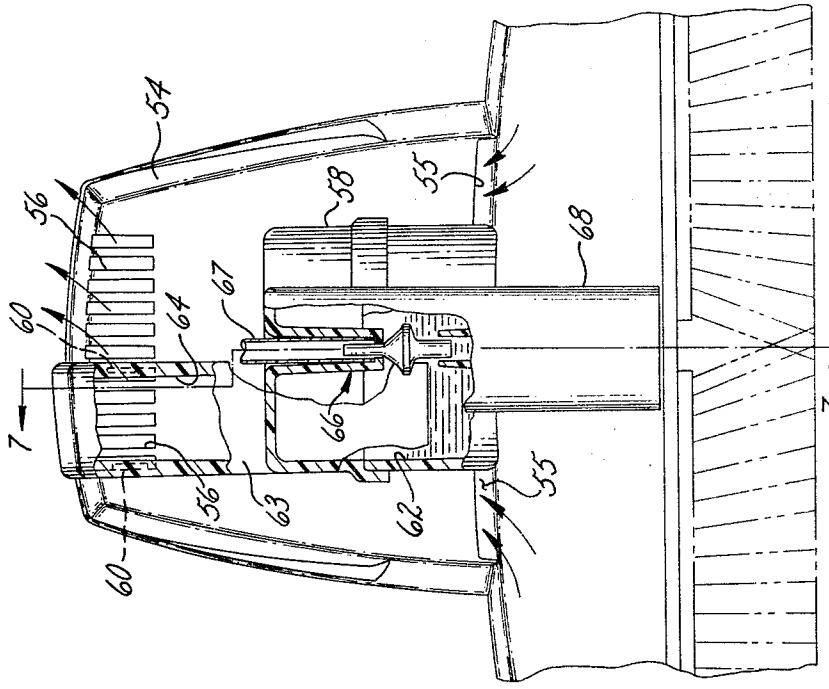

Fig-6

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3,218,657

FOAM GENERATOR FOR RUG SCRUBBING APPARATUS

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14 Claims. (Cl. 15—50)

The present invention relates to a combined floor conditioner and rug scrubber and more speciffically relates to a floor conditioner having means provided for generating foam usable in scrubbing rugs.

In recent years, light portable machines for scrubbing and polishing floors have become extremely popular. Simplifications in structure and high volume production has permitted these floor polishers or floor conditioners, as they are often called, to be sold at very low prices compared to the larger commercial units which were used for the home up until a few years ago. These polishers conventionally include an electric motor and a gear reduction interconnecting the motor with one or more horizontally disposed disc type brushes. One example of such a polisher is disclosed and claime din Jepson et al. copending application, Serial No. 106,085, filed April 27, 1961, now Patent No. 3,102,292 which application is assigned to the same assignee as the instant application.

One of the problems encountered in using a floor polisher is disclosed and claimed in Jepson et. al. copendsuitable cleansing material or solution on to the rug. Some use has been made of dry or powdered materials which are sprinkled on the rug and rubbed into engagement with the nap whereby the dirt is removed therefrom. It has been found, however, that a properly prepared foam made from a detergent liquid is less expensive and more effective for rug cleaning. Since most floor polishers are equipped or adapted to be equipped with reservoirs for dispensing detergents or wax on to hard surface floors, it was a logical development to utilize these liquid reservoirs or dispensers for detergents to be applied to rugs for rug cleaning. When depositing detergents from such dispensers, there is a tendency for the solution to fall on the rug and flow downwardly into the nap before it has been turned into a foam. The detergent liquid must be made to foam if it is to be properly distributed across the rug to pick up the dirt contained therein. With the detergent deposited in liquid form, most of the liquid soaks into the rug while only a small percentage is churned into foam by the engagement of the bristles with the liquid saturated portion of the nap. As a consequence, the rug becomes soaked with much detergent liquid which is ineffective for cleaning purposes. This soaking of the rug is wasteful of the detergent and retards the drying of the rug to a degree at which it may be used again.

To obtain most efficient utilization of the detergent and to minimize the wetting of the rug, it is necessary to combine the detergent with air to produce a dry foam before it is deposited on the rug. When reference is made to a "dry foam," it is intended to describe a foam having a very small amount of liquid entrapped in the bubbles of foam. It has been found that through the use of a dry foam, it is possible to clean a rug thoroughly and have it completely dry and ready for use in a matter of a few hours. There have been many attempts at generating foam from a detergent solution for use in rug scrubbing. There are available on the market today foam generating attachments which may be used with vacuum cleaners. There are also elaborate commercial devices utilizing very complex structures to perform the foam generating function. It would be desirable to provide a simple foam

generating means which could be incorporated in all floor polishers at a very small increase in price.

Accordingly, it is an object of the present invention to provide a new and improved floor conditioner having a simple inexpensive foam generating means associated therewith.

It is another object of the present invention to provide a new and improved floor conditioner having a foam generating device integrated with the housing of the floor polisher to provide a simple and effective means of producing foam for rug scrubbing.

Still another object of the present invention is to provide an improved floor conditioner in which the air is used to cool the brush driving motor is bubbled through a liquid detergent to produce foam.

A further object of the present invention is to provide an improved floor polisher having a detergent reservoir provided in the housing and means for passing the motor cooling air through said liquid detergent to create foam for scrubbing rugs.

Another object of the present invention is to provide a foam generating attachment which may be assembled to a floor polisher to produce foam through the use of the motor cooling air which is bubbled through a quantity of liquid detergent.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view of a floor conditioner and rug scrubber of the present invention;

FIG. 2 is an enlarged front elevational view of the lower portion of the floor conditioner of FIG. 1 with certain portions thereof cut away;

FIG. 3 is a sectional view of the floor conditioner housing taken substantially along line 3—3 of FIG. 2 with the motor shown schematically and the motor supporting frame and brushes shown in full lines;

FIG. 4 is a fragmentary vertical section of the foam generator taken on line 4—4 of FIG. 3;

FIG. 5 is a fragmentary top plan view of the floor conditioner of FIG. 1 with the cover for the foam generator removed;

FIG. 6 is a rear elevational view of an alternative embodiment of the invention with certain portions thereof cut away more fully to illustrate the invention; and

FIG. 7 is a vertical section taken on line 7—7 of FIG. 6.

Briefly, the present invention is concerned with a floor conditioner having means for generating foam from a liquid detergent by passing a portion of the motor cooling air into a small detergent reservoir formed in or adjacent to the motor housing. Means are provided to regulate the level of the detergent in the generator portion of the housing which is connected to the conventional detergent dispenser or reservoir by means of a conduit.

Referring now to the drawings, there is illustrated a floor conditioner generally designated by reference numeral 20 which floor conditioner comprises a handle assembly 21 pivotally mounted to a housed power unit generally designated 22. The power unit 22 includes a motor 23 carried by a frame 24 which frame serves to support a pair of spaced disc brushes 25. The motor 23, frame 24 and a portion of the brushes 25 are enclosed within a suitable plastic housing 26. The handle assembly 21 supports a liquid dispenser or reservoir 27, the details of which are disclosed in the above-cited Jepson et al. ap-

plication, Serial No. 106,085. The dispenser 27 includes suitable control valve means for dispensing the liquid contents thereof downwardly to the housed power unit 22 through a suitable conduit 28.

The motor 23 is drivingly connected through reduction gearing 29 to the brushes 25 in the manner disclosed in detail in the above-cited Jepson et al. application, Serial No. 106,085. For the purpose of cooling the motor 23, there is provided a fan 30 supported on the upper end of motor armature shaft 31. Immediately below the fan 30 there is provided a baffle member 32 which is mounted on the motor 23 and prevents passage of air upwardly within the housing 26 except for the air which passes through the motor 23, there being a central opening 32*a* in the baffle 32 aligned with the armature and field of the motor 23. As is best shown in FIG. 3, the housing 26 is provided with an air intake slot 26*a* at the lower front thereof and an air discharge slot 26*b* at the upper front edge of the housing 26. In addition, the rear wall of the housing 26 is provided with a second discharge opening 26*c* so that air circulated upwardly through the motor by the fan 30 passes either out the front discharge slot 26*b* or the rear discharge opening 26*c*.

On the outer rear wall of the housing 26, there is provided an upwardly facing depression or recess 34 which serves as a liquid or detergent reservoir. The volume including the reservoir 34 and the space immediately above it is enclosed by means of a cover member 35 and end walls 26*d* formed integrally with the housing 26. This arrangement of the end walls with respect to the upwardly facing reservoir 34 may best be seen in FIG. 5 in which the cover member 35 has been removed for the purpose of illustration and FIG. 4 which shows only the cover 35 with the end walls 26*d* cut away.

The cover member 35 is essentially L-shaped having a front wall 35*a* and a top wall 35*b*. The housing 26 and the cover member 35 are provided with stepped interengaging lips as are evident from FIGS. 3, 4 and 5 permitting the cover member 35 to be snapped into assembled relation to the housing 26 or cemented securely thereto. The housing 26 and the cover member 35 together form two compartments which may be considered a motor chamber 36 and a foam generating chamber 37. The foam generating chamber 37 is located immediately to the rear of and substantially coextensive with the motor chamber 36 as is evident from FIG. 3. While the motor chamber 36 is defined almost entirely by the housing 26, there is at the rear top of the motor chamber 36 a transversely extending upwardly facing opening 26*e* which is closed by the top wall 35*b* of the cover member 35. As may best be seen in FIG. 5, the transverse opening 26*e* is connected to the downwardly extending opening 26*c* through which a portion of the motor cooling air is discharged into the foam generating chamber 37.

To conduct the portion of the motor cooling air which passes through opening 26*c* downwardly to a position beneath the level of the detergent contained in the reservoir 34, there is provided a vertically extending wall 35*c* on the top wall 35*b* of cover member 35. The wall 35*c* cooperates with one of the end walls 26*d* and a vertical wall 26*f* on the housing 26 to form a downwardly extending conduit which terminates at the bottom of the reservoir 34. At the bottom of the reservoir 34 the vertical wall 35*c* is spaced a small distance from the bottom of the reservoir 34 to provide a small space 38 through which air may be bubbled into the detergent contained in the reservoir. The space 38 through which air passes at the end of the conduit formed by the walls 35*c*, 26*f* and 26*d* is best shown in FIGS. 3 and 4.

The liquid detergent supplied to reservoir 34 from the dispenser 27 passes through conduit 28 into a valve 40 formed integrally with the cover member 35. The valve 40 is made up of a cylindrical connector and valve guide member 41 which extends downwardly from the top wall 35*b*. At the lower end of the cylindrical valve guide 41, there is a valve seat 42 against which a valve member 43 is seated. The valve member 43 includes an elongated guide portion 43*a*, a conical seat portion 43*b* and a float 43*c*.

As may best be seen in FIG. 5, the float 43*c* extends crosswise in the reservoir 34 and may move vertically downwardly from the position shown in FIG. 3 as the level of the detergent in reservoir 34 drops. When the valve member 43 and its float 43*c* move downwardly, liquid detergent from dispenser 27 flows through conduit 28 automatically maintaining the desired quantity of detergent in reservoir 34. As the level of the liquid detergent within the reservoir 34 rises, the float 43*c* moves upwardly until the seat portion 43*b* of the valve member 43 engages the valve seat 42 thereby obstructing flow of additional detergent through the conduit 28 into the reservoir 34. At the rear of the housing 26 there is provided a vertically extending passageway 44 which terminates behind the two brushes 25 and is located between the two brushes. This vertical passageway 44 forms a part of the foam generating chamber 37 and provides means for discharging the foam into a desired area adjacent the bristles of both of the brushes 25. If desired, the floor conditioner 20 may be supported by one or more rollers of the type shown in FIG. 3 below the passageway 44. The structural details and function of such rollers are disclosed and claimed in Jepson et al. Patent No. 3,068,503.

From the above description, the operation of the foam generator should be evident. A portion of the motor cooling air, which is discharged from the motor chamber 36 by the fan 30, moves rearwardly through the discharge opening 26*c* into the downwardly extending passageway formed by the walls 26*f*, 26*d* and 35*c*. The air is discharged through opening 38 where it bubbles through the liquid detergent contained in the reservoir 34. The air bubbled through the detergent causes bubbles of foam to be produced. This foam passes upwardly in the reservoir 34 and over the edge into the vertical passageway 44 which discharges the foam in the desired position adjacent the brushes 25. As the liquid detergent is used up through the generation of foam, the float 43*c* moves downwardly in the reservoir 34 opening the valve 40 and permitting additional liquid detergent to flow from the dispenser 27 into the reservoir 34.

It should be evident that the foam generating means disclosed above is extremely simple and inexpensive to manufacture. Almost any conventional floor conditioner may be modified to include this type of foam generator merely by retooling the motor housing. By integrating the foam generator with the housing structure, very few additional parts are required to transform a conventional floor polisher into a floor conditioner which is suitable for scrubbing rugs as well.

In FIGS. 6 and 7, there is an alternative embodiment of the invention disclosed which embodiment takes the form of an attachment which may be detachably associated with a floor polisher or floor conditioner. In this alternative embodiment, there is shown a floor conditioner 50 which may be substantially identical to the polisher disclosed and claimed in the above-cited Jepson et al. application, Serial No. 106,085. The floor conditioner 50 includes a motor 51 shown only schematically which motor is carried by a frame 52 and is drivingly related to a pair of counter rotating disc type brushes 53. There is provided a housing 54 having air intake openings 55 and air discharge slots 56.

For the purpose of adapting the floor conditioner 50 to produce a dry foam from a liquid detergent, there is provided a foam generating attachment 58. To assemble the foam generating attachment 58 to the housing 54, there is provided a lower projection 59 which is received in a suitable opening in the housing 54. The upper end of the attachment 58 has several integral flexible plastic latch portions 60 which extend into the air discharge slots

56 and secure the upper end of the generating attachment 58 detachably to the housing 54.

The generator 58 is similar in structure and function to the embodiment of FIGS. 1 through 5 except that it is made in a form so that it is detachable from the floor conditioner 50. It includes a liquid detergent reservoir 62 which is connected by means of a vertically extending conduit 63 to receive the motor cooling air discharged to the slots 56. A rearwardly facing opening 64 is provided on the attachment which opening fits directly against the front of the housing 54 with some of the slots 56 communicating with the opening 64. It may be seen that the upper portion of the vertical air conduit 63 is defined in part by the wall of the housing 54. The air passing through the conduit 54 is discharged through a space 65 beneath the level of the reservoir 62 producing the desired bubbling of air through the liquid detergent. A suitable valve 66 is provided having a float control and may be similar in structure to the valve disclosed in connection with the first embodiment. The valve 66 is interconnected to a liquid detergent dispenser by means of a conduit 67. Communicating with the top of the detergent reservoir 62 is a vertically extending foam discharge conduit 68.

The attachment 58 functions in the same manner as the earlier described embodiment. A portion of the motor cooling air is discharged down the air conduit 63 into the reservoir 62 where it bubbles through the opening 65 producing a foam which passes out of the top of the reservoir into the downwardly directed foam discharge conduit 68. The level of the liquid detergent within the reservoir 62 is automatically controlled by the float valve 66. The attachment 58 provides a simple and effective means of converting a conventional floor polisher to a floor conditioner having means for producing a dry foam from a liquid detergent. It should be noted that since there is more than enough air available from the discharge produced by the motor 51, there is no need to achieve a tight seal between the attachment 58 and the housing 54. A reasonable amount of leakage along the junction of the parts forming the air conduit 63 is not objectionable. As in connection with the earlier embodiment, the foam discharge conduit 68 serves to direct the foam to a central area between the brushes where it may be most effectively utilized.

While there have been illustrated and described several particular embodiments of floor conditioners having foam generating means associated therewith, it will be appreciated that numerous changes and modifications thereof will occur to those skilled in the art, and it is intended in the appended claims to cover all those changes and modifications that fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a floor conditioner of the type having a motor drivingly connected to a polishing and scrubbing brush and a frame supporting said motor and a housing therefor, a foam generator comprising a liquid reservoir formed in said housing, a fan driven by said motor for drawing air into said housing and through said motor, said housing being provided with a plurality of openings through which the air for cooling the motor is discharged, air conduit means connected to only a portion of said openings to deliver a part of said motor cooling air to the bottom of said reservoir beneath the surface of the liquid contained in said reservoir to produce foam at the surface of a liquid detergent contained in said reservoir, the portion of the motor cooling air not directed into said conduit means being discharged directly to the atmosphere from said housing, and means to deliver said foam from said reservoir to an area adjacent said polishing and scrubbing brush.

2. The floor conditioner of claim 1 wherein said liquid reservoir and said conduit means are detachably mounted on said housing.

3. A rug scrubbing machine comprising an air cooled electric motor supported on a frame, a pair of horizontally spaced rug scrubbing brushes journaled on said frame and drivingly connected to said motor, a housing carried by said frame and enclosing said motor, said housing having air inlet and air outlet openings, a fan driven by said motor to circulate cooling air into said housing through said motor and to discharge said air through said outlet openings, a liquid detergent reservoir, air conduit means connected to only a portion of said openings whereby part of the motor cooling air is directed beneath the surface of the liquid in the detergent reservoir and part of the cooling air is discharged directly to the atmosphere from said housing, and foam conduit means extending from said reservoir to deliver to an area between said brushes the foam produced by air bubbling through said liquid detergent.

4. A floor conditioner comprising a frame supporting a pair of disc brushes mounted for rotation about spaced vertical axes, a motor on said frame having a vertically extending armature shaft and being drivingly connected to said brushes, an inverted cup-shaped housing cooperating with said frame to form a motor chamber, air intake openings adjacent the bottom of said motor chamber, air discharge openings adjacent the top of said chamber, a fan driven by said motor for circulating air through said openings and upwardly through said motor, a foam generator having a liquid reservoir horizontally spaced from said motor, conduit means carrying air downwardly from said discharge openings to the bottom of said reservoir, and a foam conduit extending downwardly from the top of said reservoir to deposit foam formed in said reservoir to an area between said disc brushes.

5. A floor conditioner comprising a housed power unit including a motor supported by a frame and enclosed by a housing, said motor being drivingly connected to a scrubbing brush extending below said frame, a liquid reservoir provided on said housing, a handle assembly pivotally connected to said frame for manipuating said floor conditioner, a liquid detergent dispenser carried by said handle and having a flexible conduit extending from the bottom thereof to said reservoir, a float operated valve controlling the flow of liquid detergent from said dispenser to said reservoir through said flexible conduit, and supply means to deliver air beneath the surface of the liquid in said reservoir for producing foam on the surface thereof by the action of said air bubbling through said detergent.

6. A floor conditioner comprising a housed power unit including a motor supported by a frame and enclosed by a housing, said motor being drivingly connected to a scrubbing brush extending below said frame, a liquid reservoir provided on said housing, a handle assembly pivotally connected to said frame for manipulating said floor conditioner, a liquid detergent dispenser carried by said handle and having a flexible conduit extending from the bottom thereof to said reservoir, a float operated valve controlling the flow of liquid detergent through said flexible conduit from said dispenser to said reservoir, means for circulating cooling air into said housing and through said motor, and means for conducting a portion of the motor cooling air to a point below the level of the liquid in said reservoir whereby said cooling air passes through said liquid to produce foam for use in scrubbing with said brush.

7. A floor conditioner comprising a housed power unit including a motor supported by a frame and enclosed by a housing, said motor being drivingly connected to a scrubbing brush extending below said frame, a liquid reservoir provided on said housing, a handle assembly pivotally connected to said frame for manipulating said floor conditioner, a liquid detergent dis-

penser carried by said handle and having a flexible conduit extending from the bottom thereof to said reservoir, a float operated valve controlling the flow of liquid detergent through said flexible conduit from said dispenser to said reservoir, means for circulating cooling air into said housing and through said motor, means for conducting a portion of the motor cooling air to a point below the level of the liquid in said reservoir whereby said cooling air passes through said liquid to produce foam, and foam conduit means extending from the space above said reservoir to discharge said foam adjacent said brush.

8. A floor conditioner comprising a motor drivingly connected to a floor engaging brush, a housing enclosing said motor, an upwardly facing recess in the wall of said housing forming a liquid reservoir, an air pump for circulating cooling air through said motor, a cover member cooperating with said housing to form a foam generating chamber within which said reservoir is enclosed, and interengaging wall portions on said housing and said cover member forming an air conduit for directing the motor cooling air into the bottom of said recess whereby air bubbling through a liquid detergent in said reservoir will produce foam, said foam generating chamber having means for directing foam from the upper portion of said reservoir to the floor adjacent said brush.

9. The floor conditioner of claim **8** wherein said last-mentioned means comprises cooperating portions of said housing and said cover member forming a downwardly extending conduit.

10. The floor conditioner of claim **8** wherein said cover member includes a valve for controlling the flow of liquid detergent into said reservoir, a valve float positioned in said recess and adapted to control said valve to maintain the liquid in said reservoir at a predetermined level.

11. An attachment for a floor conditioner of the type having an air cooled motor drivingly connected to a surface engaging brush and a housing having an air inlet and an air discharge opening for motor cooling air, comprising a liquid reservoir, air conduit means interconnecting said air discharge opening with said reservoir to pass air through liquid detergent contained therein thereby producing foam, means for transferring said foam from said reservoir to an area adjacent said brush, float controlled valve means to maintain a selected level of liquid detergent in said reservoir, means associated with said valve to connect a liquid detergent supply conduit thereto, and means detachably mounting said attachment on said floor conditioner with said air conduit connected to receive air from said air discharge opening in said housing.

12. A combined floor polisher and rug scrubber comprising an air cooled motor drivingly connected to a surface engaging brush, a housing for said motor having an air inlet opening and an air discharge opening, means for circulating cooling air through said openings and said motor, a foam generator detachably connected to said housing, a liquid reservoir and an air conduit in said generator, said air conduit interconnecting said air discharge opening with said reservoir to discharge air beneath the surface of the liquid detergent in said reservoir to produce foam by bubbling said air through said liquid detergent, a liquid dispenser, conduit means interconnecting said dispenser and said reservoir and a float valve in said conduit means to control the level of liquid in said reservoir.

13. The combined floor polisher and rug scrubber of claim **12** including means for conducting said foam upwardly from said liquid in said reservoir and downwardly to an area adjacent said brush.

14. The combined floor polisher and rug scrubber of claim **12** wherein said dispenser is carried by a handle pivotally connected to said motor and brush, and said conduit means includes a flexible conduit member.

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